# PATENT ABSTRACTS OF JAPAN

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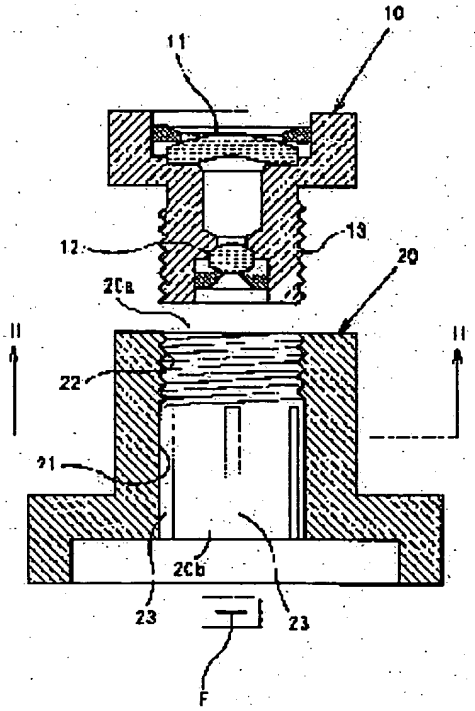
## (54) MOUNTING STRUCTURE FOR LENS FRAME

(57)Abstract:
PROBLEM TO BE SOLVED: To attain structure capable of easily obtaining required torque in adjustment when a lens frame is mounted without causing focus displacement in the mounting structure of the lens frame used in a CCD board camera, etc.
SOLUTION: A male screw part 13 is formed on the outer periphery of the lens frame 10, and a holding hole 21 is formed on the lens holder 20, and a female screw part 22 is formed on the inner periphery of the holding hole. Six ribs 23 extending in an axial direction are formed at the depth of the female screw part of the holding hole 21 keeping an equal angle interval. When the male screw part 13 is screwed in the female screw part 22, a screw groove is formed on the rib 23 by the male screw part 13. In such a way, the lens frame 10 is mounted on the lens holder 20 without causing play by the self- tapping of the lens frame 10.

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## CLAIMS

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[Claim(s)]
[Claim 1] In the attachment structure of the lens frame constituted so that the attachment section of the shape of a cylinder of a lens frame which held the lens might be attached in the maintenance hole of the circular cross section formed in the lens holder The male screw section is formed in the peripheral face of said attachment section, and the female screw section screwed in the male screw section of said attachment section is formed in the external opening side of the inner skin of said maintenance hole. To the inner side of said inner skin Attachment structure of the lens frame characterized by forming two or more ribs extended in the direction of an axis of said lens frame possible [ self tapping ] by said male screw section.
[Claim 2] In the attachment structure of the lens frame constituted so that the attachment section of the shape of a cylinder of a lens frame which held the lens might be attached in the maintenance hole of the circular cross section formed in the lens holder The male screw section is formed in the peripheral face of said attachment section. To the inner skin of said maintenance hole And/or, the external opening side of said maintenance hole is received at the external opening side of said maintenance hole. two or more ribs extended in the direction of an axis of said lens frame -- said male screw section -- self tapping -- possible -- forming -- the tip side of said attachment section -- And/or, attachment structure of the lens frame characterized by forming the guide section which carries out abbreviation fitting to the tip side of said attachment section.
[Claim 3] It is the attachment structure of the lens frame characterized by forming said rib mutually in the shape of isomorphism in claim 1 or claim 2, and being formed on the inner skin of said maintenance hole at the equiangular distance.
[Claim 4] Attachment structure of the lens frame characterized by dwindling the cross section of said rib in the introductory direction of said lens frame in claim 1 or claim 2.
[Claim 5] Attachment structure of the lens frame characterized by preparing the part which made the cross section of said rib increase gradually in the introductory direction of said lens frame to predetermined within the limits at least in claim 1 or claim 2 from the edge by the side of said external opening in said rib.

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[Translation done.]

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the attachment structure of a lens frame, and when attaching a lens frame, positioning the direction of an axis to a lens holder so that a regular focal location may be obtained especially, it relates to the attachment structure of a suitable lens frame.
[0002]
[Description of the Prior Art] Conventionally, it may attach in the lens holder attached to the body which contained the circuit board in which CCD was carried for the lens frame which held the lens as optical system used for the CCD (charge-coupled device) board camera used for supervisory equipment etc.
[0003] In this case, the male screw section is formed in a lens frame attachment-side, and the maintenance hole equipped with the female screw section corresponding to this male screw section is prepared in a lens holder. A lens frame is thrust into the maintenance hole formed in the lens holder, and it is adjusted so that a focus may be made to agree in the detection side of CCD with the amount of screw lumps. Moreover, the eccentric pin inserted in the lens holder may be made to engage with a lens frame, and rotation of an eccentric pin may adjust the immersion depth of a lens frame.
[0004] By these approaches, after performing a focus, a lens frame is fixed to a lens holder by pressing the front face of a lens frame for a screw at the tip of a screw lump and a screw to the fixed hole penetrated inside a maintenance hole from the periphery of a lens holder. In addition, there is also a method of holding elastically the lens frame other than the immobilization on the above-mentioned screw with a wavelike spring as the fixed approach of a lens frame.
[0005]
[Problem(s) to be Solved by the Invention] However, it sets in the attachment structure of the above-mentioned conventional lens frame. In case a lens frame is fixed on a screw, in using screwing of a screw, the play of engagement with the male screw of a lens frame and the female screw of a lens holder exists. Since the play of fitting of the body of a lens frame and the maintenance hole of a lens holder exists in using an eccentric pin, it originates in the thrust on a screw, the location thru/or posture of a lens frame changes, and there is a trouble that a focal location will be out of order. Moreover, since it presses at the tip of a screw and fixes, also once attaching a lens frame, by vibration or the impact, the posture of a lens frame may change and the handling after adjustment and attachment also takes cautions. Since the wavelike spring is expensive on the other hand while components mark increase, in using a wavelike spring, a manufacturing cost increases.
[0006] Moreover, since the play of the dimension of a lens frame and a lens holder exists and dispersion in the inclination of eccentricity and an axis etc. occurs into the posture of a lens frame for every adjustment / fixed activity of a lens frame in any [ of the immobilization on a screw, and immobilization with a wavelike spring ] case, quality maintenance of a product is difficult.
[0007] Furthermore, in case a lens holder is equipped with a lens frame, in order to make tuning easy, in case the introductory depth of a lens frame is adjusted, it is desirable to make it needed [ predetermined

torque ], but in order to generate predetermined screw bundle torque or the running torque of an eccentric pin, especially high process tolerance is required and it is very difficult [ it ] to obtain the optimal adjusting torque actually.

[0008] Then, this invention is to realize attachment structure of a new lens frame where the necessary torque at the time of the adjustment for lens frame attachment can be acquired easily while being able to attach a lens frame in a lens holder with high precision, without causing focal gap in view of the above-mentioned trouble.

[0009]

[Means for Solving the Problem] The means which this invention provided in order to solve the above-mentioned technical problem In the attachment structure of the lens frame constituted so that the attachment section of the shape of a cylinder of a lens frame which held the lens might be attached in the maintenance hole of the circular cross section formed in the lens holder The male screw section is formed in the peripheral face of said attachment section, and the female screw section screwed in the male screw section of said attachment section is formed in the external opening side of the inner skin of said maintenance hole. To the inner side of said inner skin It is characterized by forming two or more ribs extended in the direction of an axis of said lens frame possible [ self tapping ] by said male screw section.

[0010] Moreover, it sets in the attachment structure of the lens frame constituted so that the attachment section of the shape of a cylinder of a lens frame which held the lens might be attached in the maintenance hole of the circular cross section formed in the lens holder. The male screw section is formed in the peripheral face of said attachment section. To the inner skin of said maintenance hole And/or, the external opening side of said maintenance hole is received at the external opening side of said maintenance hole. two or more ribs extended in the direction of an axis of said lens frame -- said male screw section -- self tapping -- possible -- forming -- the tip side of said attachment section -- And/or, it is characterized by forming the guide section which carries out abbreviation fitting to the tip side of said attachment section.

[0011] It is desirable to form said rib mutually in the shape of isomorphism in these cases, and to form on the inner skin of said maintenance hole at an equiangular distance.

[0012] Moreover, it is desirable to dwindle the cross section of said rib in the introductory direction of said lens frame.

[0013] Furthermore, it is desirable to prepare at least the part which made the cross section of said rib increase gradually in the introductory direction of said lens frame in predetermined within the limits from the edge by the side of said external opening in said rib.

[0014]

[Function] It will be in the condition that tapping of the rib was carried out by the male screw section when it continued thrusting further even after contacting the rib with which it thrust into the female screw section formed in the maintenance hole of a lens holder in the male screw section which was formed in the attachment section of a lens frame according to claim 1, and the tip of the male screw section was formed in the back, and the lens frame was attached by self tapping that there is no play in a lens holder.

[0015] Since the male screw section and the female screw section have screwed beforehand on the occasion of tapping of the male screw section and a rib at this time, the location and posture of a lens frame are prescribed to some extent by fitting of both screw thread, and an inclination and heart gap of the axis of a lens frame can be prevented.

[0016] Moreover, the rotational resistance at the time of introducing a lens frame is generated with cutting force required for tapping between the male screw section and the screw thread formed in the rib of self tapping, or the frictional resistance accompanying sliding with the male screw section and the screw thread concerned. Since the rotational resistance at the time of pulling out a lens frame is generated with the frictional resistance accompanying sliding with the male screw section and the screw thread concerned Predetermined running torque can be needed for the focus control activity by adjustment of the introductory depth of a lens frame, and the workability of focus control can be

improved by adjustment of a slight amount becoming comparatively easy etc. In addition, the number of a rib, width of face, height, the cross section, etc. can adjust suitably the maintenance fixed force which fixes the running torque or both required for rotation between a lens frame and a lens holder.
[0017] Therefore, since the attachment structure by screwing with the male screw section and the rib in which the situation was carried out by self tapping without play is acquired where the location and posture of a lens frame are held Since an inclination and heart gap of the axis of a lens frame can also be prevented, and focus control also becomes easy, moreover originates in the adhesion structure by self tapping and the focal gap at the time of lens frame immobilization can also prevent it, the attachment structure of the lens frame by which focus control was carried out with high precision is realizable.
[0018] Since a lens frame and a lens holder are in a fitting condition beforehand on the occasion of tapping of the male screw section and a rib by the guide section formed in a lens frame, a lens holder, or its both according to claim 2, the location and posture of a lens frame are prescribed to some extent by both fitting, and an inclination and heart gap of the axis of a lens frame can be prevented.
[0019] In order for the male screw section to receive stress from two or more surrounding ribs equally by forming a rib mutually in the shape of isomorphism, and forming on the inner skin of a maintenance hole at an equiangular distance according to claim 3, an inclination and heart gap of the axis of a lens frame can be prevented.
[0020] When a tapping field increases, rotational resistance increases, as the lens frame is made to screw in by dwindling the cross section of a rib in the introductory direction of a lens frame according to claim 4, but since necessary resistance of the point by tapping is reduced gradually, it can reduce the rate of increase of rotational resistance, can reduce fluctuation of running torque required for a focus, and can improve the workability of focus control.
[0021] Since the amount of tapping which the male screw section performs by preparing the part which made the cross-sectional area of a rib increase gradually in the introductory direction of a lens frame to predetermined within the limits at least from the edge by the side of external opening in a rib can be made to increase gradually according to claim 5, especially, the axis of a lens frame can fall at the time of initiation of self tapping, **** gap can be prevented, and a lens frame can be attached with high precision.
[0022]
[Example] Next, the example of the attachment structure of the lens frame applied to this invention with reference to an accompanying drawing is explained. Although each of each examples shown below is related with the structure of attaching a lens frame in the lens holder (what was constituted by another object attached to the body of a camera having been united with the body of a camera (or casing).) attached in the body of a CCD board camera, this invention is not limited to these examples and can be applied to the installation structure of a large common lens frame.
[0023] The [1st example] Drawing 1 is drawing of longitudinal section showing the whole 1st example configuration, and drawing 2 is the cross-sectional view showing the condition of having cut this example along with the II-II line shown in drawing 1 . This example is the attachment structure of the lens frame 10 and the lens frame formed to the lens holder 20.
[0024] The lens frame 10 holds a lens 11 and a lens 12 in the interior, and the male screw section 13 is formed in the near periphery of the lens 12. On the other hand, the maintenance hole 21 is drilled by the lens holder 20, and the female screw section 22 is formed on the inside by the side of external opening 20a of this maintenance hole 21. On the inside by the side of internal opening 20b of the maintenance hole 21, six ribs 23 which set predetermined spacing and are extended in the direction of an axis of the maintenance hole 21 are formed following the above-mentioned female screw section 22. The rib 23 is formed by the equiangular distance on the inner skin of the maintenance hole 21, as shown in drawing 2 .
[0025] This rib 23 is smaller than the outer diameter of a projection and the male screw section 13 from the front face of the maintenance hole 21 equipped with the larger bore than the outer diameter (diameter of the virtual cylinder which touches the top of the crest of a screw) of the male screw section 13 of the lens frame 10, and it is formed so that it may have the top-most-vertices section corresponding

to a virtual cylinder side with a larger bore than the minor diameter of the male screw section 13. Although the rib 23 shown in drawing 2 is equipped with the front face of the shape of radii with an abbreviation semicircle cross section, the rib of various configurations, such as a thing with the front face of an ellipse arc and a thing with a triangle cross section or a parabolic edge section, may be formed. However, in order to position the center position of the lens frame 10 mentioned later with a sufficient precision and to prevent **** of the axis of the lens frame 10 moreover, the width of face of a rib has a desirable configuration which is dwindled toward a crowning from a base.

[0026] In this example of such a configuration, the lens frame 10 is formed with a hard ingredient rather than a lens holder 20. For example, the lens frame 10 is formed by rigid resin, such as polycarbonate resin and a liquid crystal polymer, and a lens holder 20 is formed with injection molding by comparatively elastic resin, such as ABS plastics. In this case, the polycarbonate resin which mixed the glass fiber as the quality of the material of the lens frame 10 is the most desirable. Moreover, the lens frame 10 may be formed with metals, such as an aluminium alloy and brass, and a lens holder 20 may be formed by the resin of a polycarbonate and others.

[0027] If it makes thrust into the female screw section 22 of a lens holder 20 the male screw section 13 of the lens frame 10, thrusts and dies, the tip of the male screw section 13 advances into the part in which it passes over the female screw section 22, and the rib 23 is formed, and the screw slot is cut by the rib 23 by the male screw section 13. The lens frame 10 is introduced in the maintenance hole 21 in the condition of having stuck to the lens holder 20 by self tapping by the male screw section 13 of this lens frame 10.

[0028] Making the lens frame 10 thrust into a lens holder 20, focus control is performed so that the focus of the group lens of the lens frame 10 may be made to agree in the detection location F of CCD. While the cutting force at the time of engraving a screw on a rib 23 by self tapping occurs at this time, since it is screwing in the condition that there is almost no play, by self tapping, when the male screw section 13 and a rib 23 rotate the lens frame 10, they will surely receive a necessary sliding friction. Although cutting force almost disappears once a screw is turned off by the rib 23, a sliding friction does not depend on the location or hand of cut of a lens frame, but is always generated.

[0029] In the case of focus control, in order to change the introductory depth of the lens frame 10 by above-mentioned cutting force and/or an above-mentioned sliding friction, while focal tuning -- a certain amount of running torque is needed, and detailed centering control becomes possible by this running torque -- becomes easy, maintenance of the focal location after focus control becomes certain.

[0030] Moreover, at the time of screwing of the lens frame 10, in order to perform self tapping, applying the pressure of the predetermined direction of an axis to the lens frame 10, even if play is between the male screw section 13 and the female screw section 22, the screw thread of the male screw section 13 is fixed in the condition of having been pushed against the screw thread of the female screw section 22 from the upper part. Therefore, the sliding friction of the male screw section 13 and the female screw section 22 is also generated, and it results in heightening the fixed force of the lens frame 10 further. In addition, as long as it is not necessary to adjust the location of the lens frame 10 again once carrying out focus control, fixed means, such as slushing adhesives into the screwing section of the lens frame 10 and the maintenance hole 21, may be established separately.

[0031] Since six ribs 23 are isomorphism-like and are moreover mutually formed in this example at the equiangular distance, as shown in drawing 2 , In order to receive a pressure from the surrounding rib 23 equally when the tip of the male screw section 13 advances into the formation field of a rib 23 even if play exists to some extent between the male screw section 13 of the lens frame 10, and the female screw section 22 of the maintenance hole 21, In the initial stage by which self tapping is started, centering of the lens frame 10 is carried out automatically. Moreover, in order for the rib 23 formed at the equiangular distance while subsequent was tapping going on to receive an operation almost equally from a perimeter, the center position of the lens frame 10 is held continuously, and generating of the inclination of the axis of the lens frame 10 is also prevented.

[0032] In this example, the holding power of moderate rotational resistance or a lens frame location can be acquired by forming a rib 23 on the inner skin of the maintenance hole 21, and adjusting and forming

the number of a rib 23, width of face, height, etc., since it constituted so that the screw might be turned off to this rib 23. As long as two or more numbers of a rib 23 are prepared, how many are sufficient as them, but in order to prevent an inclination and heart gap of a lens frame, it is more desirable to prepare three or more.

[0033] Moreover, as long as a rib is extended in the direction of an axis of a maintenance hole and is [ it is clear and ] in it, a rib also with the spiral rib aslant formed to the axis is sufficient as it. Moreover, the rib 23 which it is in the middle of the direction of an axis may disappear, and you may constitute so that it may generate in the angular position from which another rib differs from this location.

[0034] The [2nd example] Next, the structure of the 2nd example concerning this invention is shown in drawing 3 . Drawing 3 (a) shows the 1st pattern of this example, and drawing 3 (b) shows the 2nd pattern of this example. What is shown in drawing 3 (a) forms two or more ribs 24 which have the width of face dwindled towards the introductory direction of the same lens frame 10 as what is shown in drawing 1 on the inner skin of the maintenance hole 21. On the other hand, what is shown in drawing 3 (b) forms two or more ribs 25 which height dwindles towards the introductory direction of a lens frame.

[0035] Thus, when the male screw section of a lens frame advances the interior of the sequential maintenance hole 21 by self tapping by decreasing gradually the width of face of a rib, or height, i.e., the cross-sectional area of a rib, the screw slot deeply cut by the rib becomes short or shallow as it progresses to the inner of the maintenance hole 21, and the rotational resistance at the time of tapping and sliding can be reduced. Therefore, although it is in the inclination for running torque required for making it rotate as a lens frame is generally introduced deeply to increase, in this example, the rate of increase of such running torque can be controlled.

[0036] Here, in this example, although the width of face or the height of a rib is changed, the same operation as the above is acquired also by [ to which both sides are changed ], changing the cross-section configuration of a rib in addition to this, and dwindling the cross section of a rib as a result. The operation which controls increase of the running torque by the introductory depth of such a lens frame brings about the effectiveness that focal tuning can be performed on the almost same torque conditions in the range where the introductory depth of a lens frame is large.

[0037] The [3rd example] Next, the 3rd example which starts this invention with reference to drawing 4 is explained. As shown in drawing 4 (a), the rib 26 formed on the inner skin of the maintenance hole 21 is low formed in the female screw section 22 side, and he is trying to become high gradually towards the internal opening 20b side in this example. Moreover, it is good also as Takabe 27b, such as having been referred to as ramp 27a formed so that it might become high gradually towards the internal opening 20b side for from the female screw section 22 side to predetermined distance as shown in drawing 4 (b), and having formed the point in the same height from the boundary location B after that. In this case, the large ramp of whenever [ tilt-angle ] may be prepared in the rib by the side of not Takabe [ ramp ] but external opening 20a, and the part which inclined conversely [ whenever / tilt-angle / is small or ] into the part of the rib of the inner of the maintenance hole 21 may be prepared.

[0038] Thus, by preparing at least the ramp by the side of the female screw section 22 of a rib, or external opening 20a which height increases gradually in the predetermined range When the tip of the male screw section of a lens frame goes to the formation field of a rib from the female screw section 22 of a lens holder 20, the big amount of tapping at once (amount proportional to the formation cross section of a screw slot) is not generated. Since the amount of tapping can be made to increase little by little, an inclination and heart gap of a lens frame can be prevented.

[0039] Although the height of a rib is changed in this example, it is the point referred to as being able to form so that the amount of tapping may increase gradually, and width of face may be changed instead of the height of a rib. Moreover, if the cross section of a rib is increasing gradually as a result also by changing the both sides of width of face and height, or changing the cross-section configuration of a rib, the same effectiveness as the above-mentioned example can be acquired.

[0040] The [4th example] Next, the structure of the 4th example which starts this invention with reference to drawing 5 is explained. The point that this example consists of a lens frame 30 and a lens holder 40 is the same as each above-mentioned example. However, in the lens frame 30, it differs in that

the cylinder external surface section 34 of predetermined die length is formed in the tip side of the male screw section 33. Introductory edge 34a which that peripheral face is the smooth side where a screw is not engraved, and that tip is beveled preferably and reduces the diameter of this cylinder external surface section 34 or which comes to form the point-angle section in a curved surface is formed.
[0041] On the other hand, the maintenance hole 41 is formed in the direction of a lens holder 40, and the same rib 42 as the above-mentioned example is formed in this maintenance hole 41. In this example, in the example of the above-mentioned point, the female screw section currently formed is not formed, but the rib 42 of six isomorphism is formed in the equiangular distance until it results [ from external opening 40a ] in internal opening 40b.
[0042] In this example, the outer diameter of the cylinder external surface section 34 formed at the tip of the lens frame 30 is formed in the path which fits into the top-most vertices of the rib 42 inside the maintenance hole 41 of a lens holder 40 exactly. Therefore, first, if the cylinder external surface section 34 of the lens frame 30 is introduced into the maintenance hole 41 from external opening 40a, the lens frame 30 will be inserted by guiding the cylinder external surface section 34 to the top-most vertices of six ribs 42, where the inclination and heart gap are prevented to some extent.
[0043] If it is made to rotate, pressing the lens frame 30 in this condition, the lens frame 30 runs toward internal opening 40b, tapping a rib 42, maintaining that location and posture by guiding the cylinder external surface section 34 to a rib 42. After this, a focus control activity is done by adjustment of the introductory depth of the lens frame 30 like each above-mentioned example.
[0044] Since only two or more ribs 42 were formed on the inner skin of the maintenance hole 41 of a lens holder and the cylinder external surface section 34 was formed in the point of the lens frame 30 on the other hand in this example Although self tapping is suddenly performed at the time of screwing initiation of a lens frame, in order that the cylinder external surface section 34 and the top-most vertices of a rib 42 may fit in before that, a lens frame is guided by this fitting and an inclination and heart gap of a lens frame are prevented. Therefore, although there is a difference in structure, the almost same effectiveness as the 1st example thru/or the 3rd example is done so.
[0045] In this example, when the cylinder external surface section 34 and the maintenance hole 41 in which the rib 42 was formed fit in, a lens frame is guided, consequently posture maintenance of the lens frame in front of tapping and in tapping is attained. As the fitting structured division which has such a guide function It differs from the above-mentioned example. To the external opening 40a side of the maintenance hole 41 of a lens holder 40 Only the cylinder inside section with the bore set up so that it might fit into the male screw section 33 of a lens frame may be prepared. While preparing the cylinder external surface section same to the point of the lens frame 30 as the above-mentioned cylinder external surface section 34, preparing the cylinder inside section which fits into the cylinder external surface section concerned in the external opening 40a side of the maintenance hole 41 of a lens holder 40 is also considered, and the same effectiveness as the above-mentioned example is done so also in such structures.
[0046]
[Effect of the Invention] As explained above, where the location and posture of a lens frame are held, according to this invention Since the attachment structure by screwing with the male screw section and the rib in which the situation was carried out by self tapping without play is acquired Since an inclination and heart gap of the axis of a lens frame can also be prevented, and focus control also becomes easy, moreover originates in the adhesion structure by self tapping and the focal gap at the time of lens frame immobilization can also prevent it, the attachment structure of the lens frame by which focus control was carried out with high precision is realizable.

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[Translation done.]

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## TECHNICAL FIELD

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[Industrial Application] This invention relates to the attachment structure of a lens frame, and when attaching a lens frame, positioning the direction of an axis to a lens holder so that a regular focal location may be obtained especially, it relates to the attachment structure of a suitable lens frame.

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PRIOR ART

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[Description of the Prior Art] Conventionally, it may attach in the lens holder attached to the body which contained the circuit board in which CCD was carried for the lens frame which held the lens as optical system used for the CCD (charge-coupled device) board camera used for supervisory equipment etc.
[0003] In this case, the male screw section is formed in a lens frame attachment-side, and the maintenance hole equipped with the female screw section corresponding to this male screw section is prepared in a lens holder. A lens frame is thrust into the maintenance hole formed in the lens holder, and it is adjusted so that a focus may be made to agree in the detection side of CCD with the amount of screw lumps. Moreover, the eccentric pin inserted in the lens holder may be made to engage with a lens frame, and rotation of an eccentric pin may adjust the immersion depth of a lens frame.
[0004] By these approaches, after performing a focus, a lens frame is fixed to a lens holder by pressing the front face of a lens frame for a screw at the tip of a screw lump and a screw to the fixed hole penetrated inside a maintenance hole from the periphery of a lens holder. In addition, there is also a method of holding elastically the lens frame other than the immobilization on the above-mentioned screw with a wavelike spring as the fixed approach of a lens frame.

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[Translation done.]

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## EFFECT OF THE INVENTION

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[Effect of the Invention] As explained above, where the location and posture of a lens frame are held, according to this invention Since the attachment structure by screwing with the male screw section and the rib in which the situation was carried out by self tapping without play is acquired Since an inclination and heart gap of the axis of a lens frame can also be prevented, and focus control also becomes easy, moreover originates in the adhesion structure by self tapping and the focal gap at the time of lens frame immobilization can also prevent it, the attachment structure of the lens frame by which focus control was carried out with high precision is realizable.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] However, it sets in the attachment structure of the above-mentioned conventional lens frame. In case a lens frame is fixed on a screw, in using screwing of a screw, the play of engagement with the male screw of a lens frame and the female screw of a lens holder exists. Since the play of fitting of the body of a lens frame and the maintenance hole of a lens holder exists in using an eccentric pin, it originates in the thrust on a screw, the location thru/or posture of a lens frame changes, and there is a trouble that a focal location will be out of order. Moreover, since it presses at the tip of a screw and fixes, also once attaching a lens frame, by vibration or the impact, the posture of a lens frame may change and the handling after adjustment and attachment also takes cautions. Since the wavelike spring is expensive on the other hand while components mark increase, in using a wavelike spring, a manufacturing cost increases.
[0006] Moreover, since the play of the dimension of a lens frame and a lens holder exists and dispersion in the inclination of eccentricity and an axis etc. occurs into the posture of a lens frame for every adjustment / fixed activity of a lens frame in any [ of the immobilization on a screw, and immobilization with a wavelike spring ] case, quality maintenance of a product is difficult.
[0007] Furthermore, in case a lens holder is equipped with a lens frame, in order to make tuning easy, in case the introductory depth of a lens frame is adjusted, it is desirable to make it needed [ predetermined torque ], but in order to generate predetermined screw bundle torque or the running torque of an eccentric pin, especially high process tolerance is required and it is very difficult [ it ] to obtain the optimal adjusting torque actually.
[0008] Then, this invention is to realize attachment structure of a new lens frame where the necessary torque at the time of the adjustment for lens frame attachment can be acquired easily while being able to attach a lens frame in a lens holder with high precision, without causing focal gap in view of the above-mentioned trouble.

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MEANS

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[Means for Solving the Problem] The means which this invention provided in order to solve the above-mentioned technical problem In the attachment structure of the lens frame constituted so that the attachment section of the shape of a cylinder of a lens frame which held the lens might be attached in the maintenance hole of the circular cross section formed in the lens holder The male screw section is formed in the peripheral face of said attachment section, and the female screw section screwed in the male screw section of said attachment section is formed in the external opening side of the inner skin of said maintenance hole. To the inner side of said inner skin It is characterized by forming two or more ribs extended in the direction of an axis of said lens frame possible [ self tapping ] by said male screw section.
[0010] Moreover, it sets in the attachment structure of the lens frame constituted so that the attachment section of the shape of a cylinder of a lens frame which held the lens might be attached in the maintenance hole of the circular cross section formed in the lens holder. The male screw section is formed in the peripheral face of said attachment section. To the inner skin of said maintenance hole And/or, the external opening side of said maintenance hole is received at the external opening side of said maintenance hole. two or more ribs extended in the direction of an axis of said lens frame -- said male screw section -- self tapping -- possible -- forming -- the tip side of said attachment section -- And/or, it is characterized by forming the guide section which carries out abbreviation fitting to the tip side of said attachment section.
[0011] It is desirable to form said rib mutually in the shape of isomorphism in these cases, and to form on the inner skin of said maintenance hole at an equiangular distance.
[0012] Moreover, it is desirable to dwindle the cross section of said rib in the introductory direction of said lens frame.
[0013] Furthermore, it is desirable to prepare at least the part which made the cross section of said rib increase gradually in the introductory direction of said lens frame in predetermined within the limits from the edge by the side of said external opening in said rib.

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[Translation done.]

## OPERATION

[Function] It will be in the condition that tapping of the rib was carried out by the male screw section when it continued thrusting further even after contacting the rib with which it thrust into the female screw section formed in the maintenance hole of a lens holder in the male screw section which was formed in the attachment section of a lens frame according to claim 1, and the tip of the male screw section was formed in the back, and the lens frame was attached by self tapping that there is no play in a lens holder.
[0015] Since the male screw section and the female screw section have screwed beforehand on the occasion of tapping of the male screw section and a rib at this time, the location and posture of a lens frame are prescribed to some extent by fitting of both screw thread, and an inclination and heart gap of the axis of a lens frame can be prevented.
[0016] Moreover, the rotational resistance at the time of introducing a lens frame is generated with cutting force required for tapping between the male screw section and the screw thread formed in the rib of self tapping, or the frictional resistance accompanying sliding with the male screw section and the screw thread concerned. Since the rotational resistance at the time of pulling out a lens frame is generated with the frictional resistance accompanying sliding with the male screw section and the screw thread concerned Predetermined running torque can be needed for the focus control activity by adjustment of the introductory depth of a lens frame, and the workability of focus control can be improved by adjustment of a slight amount becoming comparatively easy etc. In addition, the number of a rib, width of face, height, the cross section, etc. can adjust suitably the maintenance fixed force which fixes the running torque or both required for rotation between a lens frame and a lens holder.
[0017] Therefore, since the attachment structure by screwing with the male screw section and the rib in which the situation was carried out by self tapping without play is acquired where the location and posture of a lens frame are held Since an inclination and heart gap of the axis of a lens frame can also be prevented, and focus control also becomes easy, moreover originates in the adhesion structure by self tapping and the focal gap at the time of lens frame immobilization can also prevent it, the attachment structure of the lens frame by which focus control was carried out with high precision is realizable.
[0018] Since a lens frame and a lens holder are in a fitting condition beforehand on the occasion of tapping of the male screw section and a rib by the guide section formed in a lens frame, a lens holder, or its both according to claim 2, the location and posture of a lens frame are prescribed to some extent by both fitting, and an inclination and heart gap of the axis of a lens frame can be prevented.
[0019] In order for the male screw section to receive stress from two or more surrounding ribs equally by forming a rib mutually in the shape of isomorphism, and forming on the inner skin of a maintenance hole at an equiangular distance according to claim 3, an inclination and heart gap of the axis of a lens frame can be prevented.
[0020] When a tapping field increases, rotational resistance increases, as the lens frame is made to screw in by dwindling the cross section of a rib in the introductory direction of a lens frame according to claim 4, but since necessary resistance of the point by tapping is reduced gradually, it can reduce the rate of increase of rotational resistance, can reduce fluctuation of running torque required for a focus, and can

improve the workability of focus control.
[0021] Since the amount of tapping which the male screw section performs by preparing the part which made the cross-sectional area of a rib increase gradually in the introductory direction of a lens frame to predetermined within the limits at least from the edge by the side of external opening in a rib can be made to increase gradually according to claim 5, especially, the axis of a lens frame can fall at the time of initiation of self tapping, **** gap can be prevented, and a lens frame can be attached with high precision.

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[Translation done.]

* NOTICES *



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EXAMPLE

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[Example] Next, the example of the attachment structure of the lens frame applied to this invention with reference to an accompanying drawing is explained. Although each of each examples shown below is related with the structure of attaching a lens frame in the lens holder (what was constituted by another object attached to the body of a camera having been united with the body of a camera (or casing).) attached in the body of a CCD board camera, this invention is not limited to these examples and can be applied to the installation structure of a large common lens frame.

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[Translation done.]

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]
[Drawing 1] It is drawing of longitudinal section showing the structure of the 1st example concerning this invention.
[Drawing 2] It is the cross-sectional view showing the condition of having cut this 1st example along with the II-II line of drawing 1 .
[Drawing 3] They are drawing of longitudinal section (a) showing two examples of structure of the 2nd example concerning this invention, respectively, and (b).
[Drawing 4] They are drawing of longitudinal section (a) showing two examples of structure of the 3rd example concerning this invention, respectively, and (b).
[Drawing 5] It is drawing of longitudinal section showing the structure of the 4th example concerning this invention.
[Description of Notations]
10 Lens Frame
13 Male Screw Section
20 Lens Holder
20a External opening
20b Internal opening
21 Maintenance Hole
22 Female Screw Section
23, 24, 25, 26, 27, 42 Rib
27a Ramp
34 Cylinder External Surface Section (Guide Section)

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[Translation done.]

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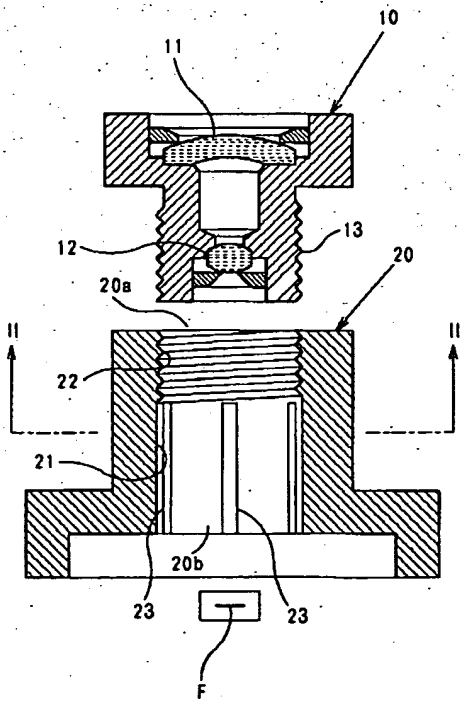
(54)【発明の名称】　レンズ枠の取付構造

(57)【要約】

【目的】　ＣＣＤボードカメラ等に使用するレンズ枠の取付構造において、焦点ズレを起こすことなく、高精度にレンズ枠をレンズホルダに取付けることができるとともに、レンズ枠取付に際しての調整時の所要トルクを容易に得ることのできる新規の構造を実現する。

【構成】　レンズ枠１０の外周面上には雄ねじ部１３が形成され、レンズホルダ２０には保持孔２１が形成され、その内周面上に雌ねじ部２２が形成されている。保持孔２１の雌ねじ部の奥部には、軸線方向に伸びる６本のリブ２３が等角度間隔に形成されている。雄ねじ部１３を雌ねじ部２２に螺入させ、ねじ込んでいくと、雄ねじ部１３によりリブ２３にネジ溝が切られる。このようにレンズ枠１０のセルフタッピングによって、レンズ枠１０はレンズホルダ２０に遊び無く取り付けられる。



【特許請求の範囲】
【請求項１】　レンズを収容したレンズ枠の円筒状の取付部を、レンズホルダに形成された円形断面の保持孔に取付けるように構成されたレンズ枠の取付構造において、
前記取付部の外周面には雄ネジ部を形成し、前記保持孔の内周面の外部開口側には前記取付部の雄ネジ部に螺合する雌ネジ部を形成し、前記内周面の奥部側には、前記レンズ枠の軸線方向に伸びる複数のリブを前記雄ネジ部によってセルフタッピング可能に形成したことを特徴とするレンズ枠の取付構造。
【請求項２】　レンズを収容したレンズ枠の円筒状の取付部を、レンズホルダに形成された円形断面の保持孔に取付けるように構成されたレンズ枠の取付構造において、
前記取付部の外周面には雄ネジ部を形成し、前記保持孔の内周面には、前記レンズ枠の軸線方向に伸びる複数のリブを前記雄ネジ部によってセルフタッピング可能に形成し、前記取付部の先端側に、及び／又は前記保持孔の外部開口側に、前記保持孔の外部開口側に対して、及び／又は前記取付部の先端側に対して、略嵌合するガイド部を形成したことを特徴とするレンズ枠の取付構造。
【請求項３】　請求項１又は請求項２において、前記リブは、相互に同形状に形成され、前記保持孔の内周面上に等角度間隔に形成されていることを特徴とするレンズ枠の取付構造。
【請求項４】　請求項１又は請求項２において、前記リブの断面積を前記レンズ枠の導入方向に漸減させたことを特徴とするレンズ枠の取付構造。
【請求項５】　請求項１又は請求項２において、前記リブにおける前記外部開口側の端部から少なくとも所定範囲内に、前記リブの断面積を前記レンズ枠の導入方向に漸増させた部分を設けたことを特徴とするレンズ枠の取付構造。
【発明の詳細な説明】
【０００１】
【産業上の利用分野】本発明はレンズ枠の取付構造に係り、特に、規定の焦点位置が得られるようにレンズホルダに対してその軸線方向の位置決めを行いながらレンズ枠を取付ける場合に好適なレンズ枠の取付構造に関する。
【０００２】
【従来の技術】従来、監視装置等に使用されるＣＣＤ（電荷結合素子）ボードカメラに用いられる光学系として、レンズを収容したレンズ枠を、ＣＣＤを搭載した回路基板を内蔵した本体に対して取付けられるレンズホルダに取付ける場合がある。
【０００３】この場合、レンズ枠の取付側には雄ネジ部を形成し、この雄ネジ部に対応する雌ネジ部を備えた保持孔をレンズホルダに設ける。レンズ枠はレンズホルダに形成された保持孔に螺入され、そのネジ込み量によりＣＣＤの検出面に焦点を合致させるように調整する。また、レンズホルダに嵌入された偏心ピンをレンズ枠に係合させ、偏心ピンの回転によりレンズ枠の挿入深さを調整する場合もある。
【０００４】これらの方法では、焦点調節を行った後、レンズホルダの外周から保持孔の内部へと貫通する固定孔にビスをネジ込み、ビスの先端でレンズ枠の表面を押圧することにより、レンズ枠をレンズホルダに対して固定する。なお、レンズ枠の固定方法として上記のビスによる固定の他に、レンズ枠を波状バネによって弾性的に保持する方法もある。
【０００５】
【発明が解決しようとする課題】しかしながら、上記従来のレンズ枠の取付構造においては、ビスによってレンズ枠を固定する際に、ネジの螺合を用いる場合にはレンズ枠の雄ネジとレンズホルダの雌ネジとの噛み合いの遊びが存在し、偏心ピンを用いる場合にはレンズ枠の円筒部とレンズホルダの保持孔との嵌合の遊びが存在することから、ビスによる押圧力に起因してレンズ枠の位置乃至姿勢が変化し、焦点位置が狂ってしまうという問題点がある。また、ビスの先端で押圧して固定するようになっているため、一旦レンズ枠を取りつけた後にも、振動や衝撃によってレンズ枠の姿勢が変化する場合があり、調整、取付後の取扱いにも注意を要する。一方、波状バネを用いる場合には部品点数が増加するとともに波状バネが高価であることから、製造コストが増大する。
【０００６】また、ビスによる固定及び波状バネによる固定のいずれの場合でも、レンズ枠とレンズホルダとの寸法の遊びが存在することから、レンズ枠の調整・固定作業毎にレンズ枠の姿勢に偏心、軸線の傾斜等のばらつきが発生するため、製品の品質保持が困難である。
【０００７】さらに、レンズ枠をレンズホルダに装着する際には、調整作業を容易にするためにレンズ枠の導入深さを調整する際に所定のトルクが必要になるようにすることが望ましいが、所定のネジ締めトルク又は偏心ピンの回転トルクを発生させるためには特に高い加工精度が要求され、現実的には、最適な調整トルクを得ることは非常に困難である。
【０００８】そこで本発明は上記問題点に鑑み、焦点ズレを起こすことなく、高精度にレンズ枠をレンズホルダに取付けることができるとともに、レンズ枠取付に際しての調整時の所要トルクを容易に得ることのできる新規のレンズ枠の取付構造を実現することにある。
【０００９】
【課題を解決するための手段】上記課題を解決するために本発明が講じた手段は、レンズを収容したレンズ枠の円筒状の取付部を、レンズホルダに形成された円形断面の保持孔に取付けるように構成されたレンズ枠の取付構造において、前記取付部の外周面には雄ネジ部を形成

し、前記保持孔の内周面の外部開口側には前記取付部の雄ネジ部に螺合する雌ネジ部を形成し、前記内周面の奥部側には、前記レンズ枠の軸線方向に伸びる複数のリブを前記雄ネジ部によってセルフタッピング可能に形成したことを特徴とする。

【００１０】また、レンズを収容したレンズ枠の円筒状の取付部を、レンズホルダに形成された円形断面の保持孔に取付けるように構成されたレンズ枠の取付構造において、前記取付部の外周面には雄ネジ部を形成し、前記保持孔の内周面には、前記レンズ枠の軸線方向に伸びる複数のリブを前記雄ネジ部によってセルフタッピング可能に形成し、前記取付部の先端側に、及び／又は前記保持孔の外部開口側に、前記保持孔の外部開口側に対して、及び／又は前記取付部の先端側に対して、略嵌合するガイド部を形成したことを特徴とする。

【００１１】これらの場合において、前記リブを相互に同形状に形成し、前記保持孔の内周面上に等角度間隔に形成することが好ましい。

【００１２】また、前記リブの断面積を前記レンズ枠の導入方向に漸減させることが好ましい。

【００１３】さらに、前記リブにおける前記外部開口側の端部から少なくとも所定範囲内に、前記リブの断面積を前記レンズ枠の導入方向に漸増させた部分を設けることが好ましい。

【００１４】

【作用】請求項１によれば、レンズ枠の取付部に形成された雄ネジ部をレンズホルダの保持孔に形成された雌ネジ部に螺入し、雄ネジ部の先端が奥に形成されたリブに当接した後もさらに螺入し続けていくと、雄ネジ部によりリブがタッピングされて、レンズ枠はセルフタッピングによりレンズホルダに遊びなく取付けられた状態となる。

【００１５】このとき、雄ネジ部とリブとのタッピングに際して、予め雄ネジ部と雌ネジ部とが螺合しているので、両者のネジ山の嵌合によりレンズ枠の位置及び姿勢がある程度規定され、レンズ枠の軸線の傾斜や芯ズレを防止することができる。

【００１６】また、レンズ枠を導入する際の回転抵抗は、雄ネジ部とセルフタッピングによりリブに形成されたネジ山との間のタッピングに必要な切削抵抗又は雄ネジ部と当該ネジ山との摺動に伴う摩擦抵抗により発生し、レンズ枠を引き出す際の回転抵抗は雄ネジ部と当該ネジ山との摺動に伴う摩擦抵抗により発生するので、レンズ枠の導入深さの調整による焦点調整作業に所定の回転トルクが必要になり、微少量の調整も比較的容易になる等により、焦点調整の作業性を向上することができる。なお、レンズ枠とレンズホルダとの間の回転に必要な回転トルク若しくは両者を固定する保持固定力は、リブの本数、幅、高さ、断面積等により適宜調整することができる。

【００１７】したがって、レンズ枠の位置及び姿勢が保持された状態で、セルフタッピングにより遊びなく形勢された雄ネジ部とリブとの螺合による取付構造が得られるので、レンズ枠の軸線の傾斜や芯ズレも防止でき、また、焦点調整も容易になり、しかもセルフタッピングによる密着構造に起因してレンズ枠固定時の焦点ズレも防止できるから、高精度に焦点調整されたレンズ枠の取付構造を実現できる。

【００１８】請求項２によれば、雄ネジ部とリブとのタッピングに際して、予め、レンズ枠とレンズホルダのいずれか又はその両方に形成されたガイド部によりレンズ枠とレンズホルダとが嵌合状態にあるので、両者の嵌合によりレンズ枠の位置及び姿勢がある程度規定され、レンズ枠の軸線の傾斜や芯ズレを防止できる。

【００１９】請求項３によれば、リブを相互に同形状に形成し、保持孔の内周面上に等角度間隔に形成することにより、雄ネジ部が周囲の複数のリブから均等に応力を受けるようになるため、レンズ枠の軸線の傾斜や芯ズレを防止することができる。

【００２０】請求項４によれば、リブの断面積をレンズ枠の導入方向に漸減させることにより、レンズ枠を螺入させていくに従って、タッピング領域が増加することにより回転抵抗は増大するが、タッピングによる先端部の所要抵抗は漸次低減されていくので、回転抵抗の増加率を低減することができ、焦点調節に必要な回転トルクの変動を低減でき、焦点調整の作業性を向上することができる。

【００２１】請求項５によれば、リブにおける外部開口側の端部から少なくとも所定範囲内に、リブの断面積をレンズ枠の導入方向に漸増させた部分を設けることにより、雄ネジ部が行うタッピング量を漸増させていくことができるので、特にセルフタッピングの開始時において、レンズ枠の軸線の倒れや芯ズレを防止することができ、レンズ枠を高精度に取付けることができる。

【００２２】

【実施例】次に、添付図面を参照して本発明に係るレンズ枠の取付構造の実施例を説明する。以下に示す各実施例は、いずれもＣＣＤボードカメラの本体に取り付けられたレンズホルダ（カメラ本体に対して取り付けられた別体に構成されたものでも、カメラ本体（又はケーシング）に一体化されたものでもよい。）にレンズ枠を取り付ける構造に関するものであるが、本発明はこれらの実施例に限定されるものではなく、広く一般的なレンズ枠の取り付け構造に適用できるものである。

【００２３】〔第１実施例〕図１は第１実施例の全体構成を示す縦断面図であり、図２は本実施例を図１に示すII－II線に沿って切断した状態を示す横断面図である。本実施例はレンズ枠１０とレンズホルダ２０に対して形成されたレンズ枠の取付構造である。

【００２４】レンズ枠１０は、レンズ１１及びレンズ１

２を内部に収容したものであり、そのレンズ１２の側の外周に雄ネジ部１３が形成されている。一方、レンズホルダ２０には、保持孔２１が穿設され、この保持孔２１の外部開口２０ａ側の内面上に雌ネジ部２２が形成されている。保持孔２１の内部開口２０ｂ側の内面上には、上記雌ネジ部２２に続いて、若しくは所定の間隔をおいて保持孔２１の軸線方向に伸びる６本のリブ２３が形成されている。リブ２３は、図２に示すように保持孔２１の内周面上に等角度間隔で形成されている。

【００２５】このリブ２３は、レンズ枠１０の雄ネジ部１３の外径（ネジの山の頂に接する仮想円筒の直径）よりも大きい内径を備えた保持孔２１の表面上から突出し、雄ネジ部１３の外径よりも小さく、雄ネジ部１３の谷の径よりも大きい内径を持つ仮想円筒面に合致する頂点部を持つように形成されている。図２に示すリブ２３は略半円断面を持つ円弧状の表面を備えているが、楕円弧状の表面を持つもの、三角形断面や台形断面を持つもの等、種々の形状のリブを形成してもよい。但し、後述するレンズ枠１０の中心位置を精度良く位置決めし、しかもレンズ枠１０の軸線の倒れを防止するために、リブの幅は基部から頂部に向かって漸減するような形状が好ましい。

【００２６】このような構成の本実施例においては、レンズ枠１０はレンズホルダ２０よりも硬質の材料で形成される。例えば、レンズ枠１０をポリカーボネート樹脂、液晶ポリマー等の硬質樹脂で形成し、レンズホルダ２０をＡＢＳ樹脂等の比較的軟質の樹脂で射出成形により形成する。この場合、レンズ枠１０の材質としてはガラス繊維を混合したポリカーボネート樹脂が最も好ましい。また、レンズ枠１０をアルミニウム合金や真鍮等の金属で形成し、レンズホルダ２０をポリカーボネートその他の樹脂で形成してもよい。

【００２７】レンズ枠１０の雄ネジ部１３をレンズホルダ２０の雌ネジ部２２に螺入させ、ねじ込んでゆくと、雄ネジ部１３の先端が雌ネジ部２２を過ぎてリブ２３の形成されている部分に進入し、雄ネジ部１３によってリブ２３にネジ溝が切られていく。このレンズ枠１０の雄ネジ部１３によるセルフタッピングによって、レンズ枠１０はレンズホルダ２０に対して密着した状態で保持孔２１内に導入されていく。

【００２８】焦点調整は、レンズ枠１０をレンズホルダ２０に螺入させながらＣＣＤの検出位置Ｆにレンズ枠１０の組レンズの焦点を合致させるように行われる。この時、セルフタッピングによりリブ２３にネジを刻設してゆく際の切削抵抗が発生するとともに、雄ネジ部１３とリブ２３とはセルフタッピングによって殆ど遊びのない状態で螺合しているので、レンズ枠１０を回転させると必ず所要の摺動抵抗を受けることになる。切削抵抗は一旦リブ２３にネジが切られた後には殆ど消失するが、摺動抵抗はレンズ枠の位置や回転方向に依らず常時発生する。

【００２９】焦点調整の際には、上記の切削抵抗及び／又は摺動抵抗によって、レンズ枠１０の導入深さを変えるためにある程度の回転トルクが必要となり、この回転トルクによって微細な位置調節が可能になる等、焦点の調整作業が容易になるとともに、焦点調整後の焦点位置の保持が確実になる。

【００３０】また、レンズ枠１０の螺入時には、レンズ枠１０に所定の軸線方向の圧力を加えながらセルフタッピングを行っていくため、雄ネジ部１３と雌ネジ部２２との間に遊びがあっても、雄ネジ部１３のネジ山が雌ネジ部２２のネジ山に上方から押し付けられた状態で固定される。したがって、雄ネジ部１３と雌ネジ部２２との摺動抵抗も発生し、レンズ枠１０の固定力をさらに高める結果になる。なお、一旦焦点調整をした後に再びレンズ枠１０の位置を調整する必要がなければ、レンズ枠１０と保持孔２１との螺合部に接着剤を流し込む等の固定手段を別途設けてもよい。

【００３１】本実施例では、図２に示すように、６本のリブ２３が相互に同形状であり、しかも等角度間隔に形成されているため、レンズ枠１０の雄ネジ部１３と保持孔２１の雌ネジ部２２との間にある程度遊びが存在していても、雄ネジ部１３の先端がリブ２３の形成領域に進入した際に、周囲のリブ２３から均等に圧力を受けるため、セルフタッピングが開始される初期段階において、自動的にレンズ枠１０がセンタリングされる。また、その後のタッピング進行中においても、等角度間隔に形成されたリブ２３によって周囲からほぼ均等に作用を受けるため、レンズ枠１０の中心位置が継続的に保持され、レンズ枠１０の軸線の傾斜の発生も防止される。

【００３２】本実施例では、保持孔２１の内周面上にリブ２３を設けて、このリブ２３にネジを切っていくように構成したので、リブ２３の本数、幅、高さ等を調整して形成することにより、適度な回転抵抗乃至はレンズ枠位置の保持力を得ることができる。リブ２３の本数は、複数設けられていれば何本でもよいが、レンズ枠の傾斜や芯ズレを防止するためには３本以上設けることがより好ましい。

【００３３】また、リブは、保持孔の軸線方向に伸びてさえいれば、軸線に対して斜めに形成されたリブでも、螺旋状のリブでもよい。また、軸線方向の途中であるリブ２３が消滅し、この場所から別のリブが異なる角度位置において発生するように構成してもよい。

【００３４】〔第２実施例〕次に、図３には本発明に係る第２実施例の構造を示す。図３（ａ）は本実施例の第１のパターンを、図３（ｂ）は本実施例の第２のパターンを示す。図３（ａ）に示すものは、保持孔２１の内周面上に、図１に示すものと同様のレンズ枠１０の導入方向に向けて漸減する幅を持つリブ２４を複数形成したものである。一方、図３（ｂ）に示すものは、レンズ枠の

導入方向に向けて高さの漸減するリブ２５を複数形成したものである。

【００３５】このようにリブの幅若しくは高さ、即ちリブの断面積を次第に減少させてゆくことにより、レンズ枠の雄ネジ部がセルフタッピングによって順次保持孔２１の内部を進行していくとき、保持孔２１の奥部に進むに従ってリブに切り込まれるネジ溝が短く若しくは浅くなり、タッピング時及び摺動時の回転抵抗を低減することができる。したがって、一般にはレンズ枠が深く導入されるに従って回転させるのに必要な回転トルクが増大していく傾向にあるが、本実施例では、このような回転トルクの増加率を抑制することができる。

【００３６】ここで、本実施例では、リブの幅又は高さを変化させているが、双方を変化させるその他リブの断面形状を変化させ、結果的にリブの断面積を漸減させることによっても、上記と同様の作用が得られる。このようなレンズ枠の導入深さによる回転トルクの増大を抑制する作用は、レンズ枠の導入深さの広い範囲でほぼ同様のトルク条件で焦点の調整作業を行うことができるという効果をもたらす。

【００３７】〔第３実施例〕次に、図４を参照して本発明に係る第３実施例を説明する。この実施例では、図４（ａ）に示すように保持孔２１の内周面上に形成されたリブ２６を雌ネジ部２２側においては低く形成し、内部開口２０ｂ側に向けて次第に高くなるようにしている。また、図４（ｂ）に示すように雌ネジ部２２側から所定距離までを内部開口２０ｂ側に向けて次第に高くなるように形成した傾斜部２７ａとし、その後、境界位置Ｂから先を同じ高さに形成した等高部２７ｂとしてもよい。この場合、傾斜部と等高部ではなく、外部開口２０ａ側のリブに傾斜角度の大きい傾斜部を設け、保持孔２１の奥部のリブの部分に傾斜角度の小さい若しくは逆に傾斜した部分を設けてもよい。

【００３８】このように、リブの雌ネジ部２２側若しくは外部開口２０ａ側における少なくとも所定範囲に高さの漸増する傾斜部を設けることにより、レンズ枠の雄ネジ部の先端がレンズホルダ２０の雌ネジ部２２からリブの形成領域に進むとき、一度に大きなタッピング量（ネジ溝の形成断面積に比例する量）を発生させるのではなく、少しづつタッピング量を増加させていくことができるので、レンズ枠の傾斜や芯ズレを防止することができる。

【００３９】本実施例においてはリブの高さを変化させているが、タッピング量が次第に増加するように形成することができると言う点で、リブの高さの代わりに幅を変化させてもよい。また、幅及び高さの双方を変化させたり、リブの断面形状を変化させることによっても、結果的にリブの断面積が漸増していれば、上記実施例と同様の効果を得ることができる。

【００４０】〔第４実施例〕次に、図５を参照して本発明に係る第４実施例の構造を説明する。この実施例は、レンズ枠３０とレンズホルダ４０とから構成される点は上記各実施例と同様である。しかし、レンズ枠３０には、雄ネジ部３３の先端側に所定長さの円筒外面部３４が形成されている点が異なる。この円筒外面部３４はその外周面がネジの刻設されていない平滑面となっていて、好ましくはその先端が面取りされて縮径し、或いは先端角部が曲面に形成されてなる導入端部３４ａが形成される。

【００４１】一方、レンズホルダ４０の方には保持孔４１が形成され、この保持孔４１には上記実施例と同様のリブ４２が形成されている。この実施例においては、上記の先の実施例では形成されていた雌ネジ部が形成されておらず、外部開口４０ａから内部開口４０ｂに至るまで６本の同形のリブ４２が等角度間隔に形成されている。

【００４２】この実施例では、レンズ枠３０の先端に形成された円筒外面部３４の外径は、レンズホルダ４０の保持孔４１の内部のリブ４２の頂点に丁度嵌合する径に形成されている。したがって、先ず、レンズ枠３０の円筒外面部３４を外部開口４０ａから保持孔４１内へ導入すると、レンズ枠３０は、その円筒外面部３４が６本のリブ４２の頂点にガイドされることにより、その傾斜や芯ズレがある程度防止された状態で挿入される。

【００４３】この状態でレンズ枠３０を押圧しながら回転させると、円筒外面部３４がリブ４２にガイドされることによりその位置及び姿勢を維持しながら、レンズ枠３０はリブ４２をタッピングしながら内部開口４０ｂに向かって進行していく。この後は、上記各実施例と同様にレンズ枠３０の導入深さの調整により焦点調整作業が行われる。

【００４４】この実施例では、レンズホルダの保持孔４１の内周面上に複数のリブ４２のみを形成し、その一方でレンズ枠３０の先端部に円筒外面部３４を形成したので、レンズ枠の螺入開始時にいきなりセルフタッピングが行われるものの、その前に円筒外面部３４とリブ４２の頂点とが嵌合するため、この嵌合によりレンズ枠がガイドされ、レンズ枠の傾斜や芯ズレが防止される。したがって、構造上の相違があるにも拘わらず、ほぼ第１実施例乃至第３実施例と同様の効果を奏する。

【００４５】本実施例では、円筒外面部３４とリブ４２を形成した保持孔４１とが嵌合することによってレンズ枠がガイドされ、その結果、タッピング前及びタッピング中におけるレンズ枠の姿勢保持が可能になっている。このようなガイド機能を有する嵌合構造部としては、上記実施例とは異なり、レンズホルダ４０の保持孔４１の外部開口４０ａ側に、レンズ枠の雄ネジ部３３に嵌合するように設定された内径を持つ円筒内面部だけを設けてもよく、或いは、レンズ枠３０の先端部に上記円筒外面部３４と同様の円筒外面部を設ける一方、レンズホルダ

４０の保持孔４１の外部開口４０ａ側に、当該円筒外面部に嵌合する円筒内面部を設けることも考えられ、これらの構造においても、上記実施例と同様の効果を奏する。

【００４６】

【発明の効果】以上説明したように本発明によれば、レンズ枠の位置及び姿勢が保持された状態で、セルフタッピングにより遊びなく形勢された雄ネジ部とリブとの螺合による取付構造が得られるので、レンズ枠の軸線の傾斜や芯ズレも防止でき、また、焦点調整も容易になり、しかもセルフタッピングによる密着構造に起因してレンズ枠固定時の焦点ズレも防止できるから、高精度に焦点調整されたレンズ枠の取付構造を実現できる。

【図面の簡単な説明】

【図１】本発明に係る第１実施例の構造を示す縦断面図である。

【図２】同第１実施例を図１のII－II線に沿って切断した状態を示す横断面図である。

【図３】本発明に係る第２実施例の２つの構造例をそれぞれ示す縦断面図（ａ）及び（ｂ）である。

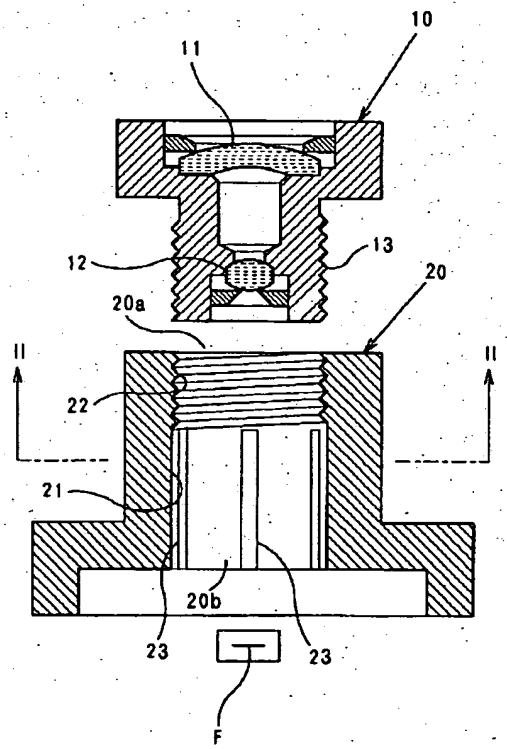
【図４】本発明に係る第３実施例の２つの構造例をそれぞれ示す縦断面図（ａ）及び（ｂ）である。

【図５】本発明に係る第４実施例の構造を示す縦断面図である。

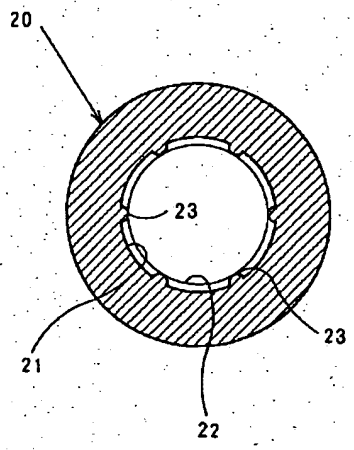
【符号の説明】

１０　レンズ枠
１３　雄ネジ部
２０　レンズホルダ
２０ａ　外部開口
２０ｂ　内部開口
２１　保持孔
２２　雌ネジ部
２３，２４，２５，２６，２７，４２　リブ
２７ａ　傾斜部
３４　円筒外面部（ガイド部）

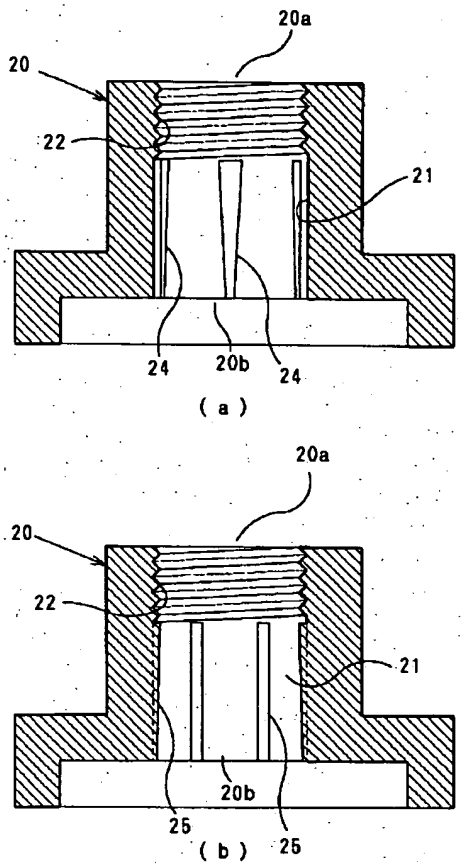
【図１】



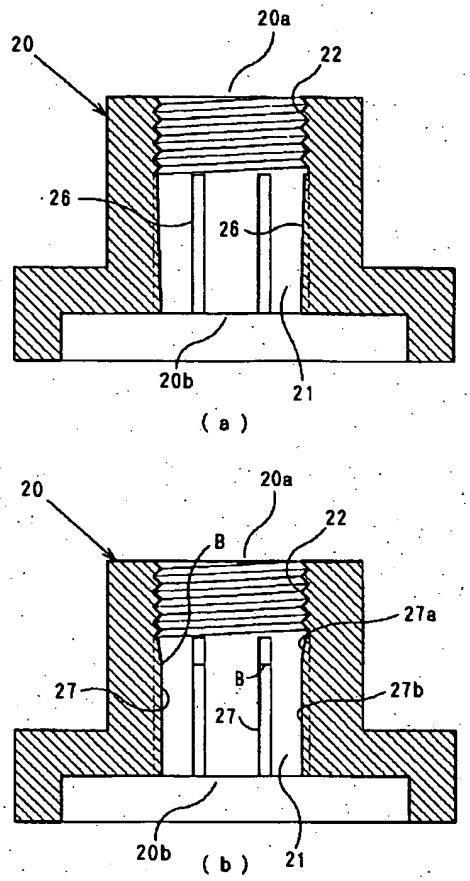

【図２】



【図3】


20a
20
22
21
24
20b
24
( a )
20a
20
22
21
25
20b
25
( b )

【図4】


20a
20
22
26
26
20b
21
( a )
20
20a
22
B
27a
27
B
27b
27
20b
21
( b )

【図5】